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Taming the Unfriendly System: Microcomputers as Patron Terminals to Access an Online Catalog

Two concepts capture the spirit of this discussion. The first is a quote by Marshall McLuhan who said about technology: "If it works it's obsolete."[1] The other is Finagle's Law Of Information which states:

> The information you have is not what you want
> The information you want is not what you need
> The information you need is not available.[2]

Automation in libraries has been on a rapidly moving roller coaster over the past decade. At first the major concerns were whether to automate with the few existing vendor systems. Many libraries designed their own systems while others shopped around or waited. Over the past five years many turnkey systems promising an automation nirvana for libraries were developed. This conference and the growing body of literature shift this emphasis toward making these systems easier to use. An even newer concern is how to develop integrated systems or "information gateways" to allow access to expanding internal and external databases.

The rallying cry for librarians is not whether to automate, but can we automate our many internal processes and access external systems from the same terminal. Automation, however, takes place within the constraints of limited money. The question becomes, How can we allow all patrons easy and quick access to a new world of information choices?

We have slowly—and sometimes quite painfully (in terms of money and staff morale)—come to the realization that automation might not be the panacea. The programming proverb "Garbage in—garbage out" is haunting many a library committee as its members wrestle with past cataloging and classification inconsistencies. Automating our catalogs or circulation functions means users must develop entirely new habits in

their quest for information. In addition, making only our catalogs available online is not enough for many patrons. On many occasions we have found patrons attempting to locate citations to journal articles in our online catalog. When told they couldn't do this, their most common responses were Why? or I thought that computers could do this.

Searching these online catalogs is another problem area. In many searches more than one patron-initiated action is necessary to find a citation to a specific book (e.g., a title search finding many matches might need narrowing). Remembering a long set of commands or different search strategies for authors, titles, or subjects is difficult for patrons who are infrequent library users. Having thousands of new freshmen, graduate students, and faculty needing assistance each year can strain an already difficult bibliographic instruction program. The cost in staff morale is immeasurable.

In user friendly systems, symbols are explained and patrons are led through this maze of commands. Many librarians need help with systems that are not friendly or friendly enough. How can they improve these systems? Is there a system flexible enough to allow access to numerous systems at the same time? The answer to all these questions is microcomputers. Before proving this to you, I would like to present an overview on the direction of catalog and circulation automation within Illinois academic libraries.

Automation in Illinois

At present there is an automated short-record circulation system called LCS. LCS is the largest cooperative resource sharing network located within a single state. Every academic library desiring state money for automation must join LCS. There are twenty-seven member libraries including every four-year state-supported university and ten private institutions like DePaul and Judson College. As of April 1986, they have input 8.9 million titles and 15.4 million volumes into an IBM 3801 computer located in Chicago.

Members agree to share any circulating item with patrons associated with other member institutions. Delivery of materials takes seven to ten days and is through the Inter-System Library Delivery Service, an Illinois State Library funded operation. Each library has its own separate database, but every one of the 637 terminals can search each database individually. In FY86 there will be over 35 million searches on the system and over 300,000 interlibrary circulation transactions. Since the network's inception a little over five years ago, LCS schools have borrowed from each other over 1.25 million items.[3]

At the University of Illinois at Urbana-Champaign (UIUC), LCS is a known-item circulation system. The system came from Ohio State University (OSU) in the late 1970s and is totally different from the OSU system in record appearance and searching capabilities. Library locations, call numbers, and circulation status are given for every book or journal ever cataloged on the UIUC campus. In addition, serial holdings and order records are also included in LCS. Searches by author, author-title, title, specific call number, and a general call number range are possible.

A searching algorithm consists of a three-letter command followed by a slash and then a six-three or four-five combination of letters from the author's name or item's title. Books written by Kate Turabian are found in LCS by entering AUT/TURABIKAT followed by a carriage return. There are six different three-letter commands and four two-letter commands used to manipulate individual screens. In all there are ninety-six permutations of searches using these commands. In addition, there are 107 stopwords to remember not to use if they appear anywhere in a title or author's name. After getting a record the patron must know the symbols for locations and there are over 120 of these symbols. Searching another LCS school, patrons must put a two-letter code at the end of the command and then search the twenty-six databases separately. That could involve keying in sixteen characters twenty-six times (e.g., to search for Turabian at DePaul one does AUT/TURABIKAT/DP).

To make things more confusing, we have in the past year brought up our Full Bibliographic Record system or FBR for short. FBR contains materials cataloged in UIUC since we joined OCLC in late 1974. There are almost 1 million bibliographic records and over 2.3 million authority records. Included in the authority file are the Library of Congress name and subject heading tapes. A government grant to develop FBR stipulated that we include a public library in the development stages. The River Bend Library System agreed to test FBR with us. At present no LCS school participates in FBR.

FBR is searchable by subject, author, series, ISBN, ISSN, and by keyword title or keyword corporate authors. Boolean searches and right-side truncation are also possible for most searches. However, searches of FBR use a different command language and searching algorithm from LCS. There are over fifty possible searching algorithms using FBR. The stopword list used by FBR is smaller than that used by LCS. In calendar year 1985, over 5.5 million searches took place on FBR. After a FBR search, a link to the corresponding LCS circulation record must be made to find locations. We wanted to direct all known-item searches to LCS first because LCS contains records for everything ever cataloged at UIUC. There are 3 million titles in LCS *v.* only 1 million titles in FBR.

By the end of 1986, an ILLINET Statewide Online Catalog including everything cataloged via OCLC by every library in Illinois will exist. This catalog will contain over 3.4 million unique titles from more than 280 libraries. Using FBR searching algorithms, a user at any terminal will first search the local database and then will be able to look for an item anywhere in the state. Until FBR has an interlibrary loan module, only items from LCS schools will have a link to a corresponding circulation record. Other items will be available through the old interlibrary loan method.

Figure 1 shows some of the questions patrons must answer and understand before they can successfully search our system. Wrong answers to any question or not understanding the concepts behind these questions led to high failure rates in our online catalog. We have two command-driven systems that use different searching algorithms with different stopwords and access points. This also increased the failure rate.

Every time someone wanted to search for a book or journal they had to know what they were doing or else have help from a staff member. Printed search aids and online help screens are available at every terminal. However, the longer a patron sits at any terminal the less chance that someone else can do a search. The longer a search takes the more frustrated a waiting patron becomes and the longer the queues. In addition, our suggestion box was filled with complaints about our system. Since we have only eighty-nine public terminals we needed to be sure that patrons could search our online catalog rapidly, yet successfully. We also had to relieve the burden placed upon the staff of constantly explaining every search in two different systems. Staff morale was at an all-time low and sinking fast. We needed to make a totally unfriendly system user friendly.

Defining User Friendly

Before developing or accepting an interface to any system one must define the goals of that interface. We had eight criteria that we wanted our interface to meet. They were as follows:

1. that any patron can easily and rapidly use the system to find most things looked for without having to use commands or ask for help;
2. that patrons, in order to realize the full power of our system (i.e., being able to do every type of search), should be allowed to use commands from any terminal if they want;
3. that certain types of searches are not used that much and should be done only through the command syntax (e.g., a Boolean search of an ISBN and subject);
4. that the system response rate, which was less than a second in most searches and not more than three to four seconds in others, cannot be compromised;

```
1. Which system do I search?
   LCS for known item or location/circulation information
   FBR for subject, keyword, new material
2. What are the commands?  How are they entered?
   LCS -- AUT/ 6 - 3
   FBR -- F A   Last name  first name  middle name or initial
          T A   To search the authority file for correct
                heading
3. What does the three letter location code on LCS mean?
   STX = stacks  UGX = undergraduate library
4. How do I find call numbers/locations after searching FBR?
   Use link command
5. What if my subject heading does not work?
   Check online authority file
   Then issue find command to get bibliographic records
   Then use link command to get LCS record
7. How do I pick out one match from many on the screen?
   Use DSL/line number command
```

Figure 1. Thought Processes Necessary to Search Our Online Catalog

5. that the interface should improve some of the shortcomings inherent in any system;
6. that the interface with minor changes for location and circulation codes should be usable in all of the other LCS libraries;
7. that the interface's development be evolutionary and easy to change and update as the capabilities of the system changed; and
8. that the interface will not deter but assist us to incorporate future technological and software innovations into our system.

With these assumptions in mind, we decided there were two ways to implement a user friendly interface. One method involved the development of programs residing on the mainframe computer in Chicago. However, this was not viable because of two important reasons. First, it would increase the amount of communication between the mainframe computer in Chicago and hundreds of terminals around the state. This would not be an efficient use of either the communication lines or the mainframe. On a computer doing 35 million searches, response time could be degraded. The second reason involves the political nature of any large network. Change happens very slowly if at all. Program changes on the mainframe are difficult and time consuming because in this network, decisions for software updates are made by committee. The best solution to our problem of the unfriendly system was an interface developed and controlled at the local level.

An interface acts as a translator. The human speaks one language, the computer processor another, and the interface software mediates between the two. It transforms the general wishes of man into the exact commands demanded by the processor. We wanted these wishes to be correctly conveyed before they reached the mainframe. Employing intelligent terminals to access the mainframe was the answer. C.C. Cheng, a professor in our Linguistics Department, helped us toward this solution by developing and writing the interface.

The interface resides in IBM personal computers. The programming for the interface is primarily in BASIC with a small part in assembly language. These personal computers do not have disk drives and at present only search the online catalog. They were purchased in 1983 and at the time were much cheaper than models having disk drives. The program transfers from a floppy disk to a cassette and then the cassette runs the program into the personal computers. The transfer time is approximately four minutes per terminal. The personal computers stay on twenty-four hours a day. The interface needs reloading only when a change is made in the program or the power fails.

Cheng's premise behind the design of the interface was to program "a user interface aimed at capturing the natural processes of the user search and at providing a graceful interaction between the patron and the computer."[4] He wanted to unlock the power of the online catalog but at the same time have the patron need only typing skills to use the system. For those patrons who learn how to use our online catalog, the personal computers are also searchable using the command language. The following examples detail the power inherent in using the interface.

The interface is a menu with only five choices for searching (see fig. 2). All searches, except subjects, go first to LCS. If the search is unsuccessful, the patron could then search FBR. If the patron pressed the question mark

key, he or she would go through one short help screen. The help screen has paragraphs comparing LCS with FBR, information about correcting mistakes, location of the return key, and information as to how to contact Cheng with suggestions. Since the interface is self-explanatory, this was the only help screen necessary to use the online catalog. The numbers in the upper right-hand corner are a real-time clock. This clock assists students in getting to class on time and may help to speed up users' time at the terminal.

```
INTERFACE READY ( SEE THE BOTTOM LINE TO SEARCH; PRESS <?>
          FOR HELP. )



PRESS 1 FOR AUTHOR-TITLE 2: TITLE 3: AUTHOR 4: CALL NO. ETC.
          5: SUBJECT
```

Figure 2. First Screen of the Interface

Figure 3 presents a typical title-search sequence. What the patron enters is shown in quotation marks for illustrative purposes. A normal search of our online catalog does not need quotation marks. What the interface actually sends to the mainframe is in small letters. This does not actually appear on the screen during a search. The patron answers yes if looking for a periodical. LCS has the ability to limit search results to serials only. The patron then is asked to give the first and second words of the title. If any of the 107 stopwords are input, the computer beeps and instructs the user to replace that word with another word. The interface takes the words input by the patron and puts them into the appropriate LCS searching algorithm (e.g., TLS/PETEPRINC). This command goes to the mainframe computer. Two matches return and the patron is asked for a line number (e.g., "2") and the interface does the LCS command DSL/2. An explanation of what appears on the screen can be seen by asking for help. A patron can then charge out the book. We allow patrons to charge their own books from every library on and off campus. Patrons can also search other libraries, and the interface then automatically searches the databases of all the other twenty-seven LCS schools. The searcher does not have to

remember the two-letter codes or input the sixteen characters. The interface instructs the user as how to charge the book from another campus. Patrons with invalid identification cards (IDs) or holds on their IDs are instructed to ask for help. This whole process is rapid and mistake proof.

```
BEGINNING OF SEARCH

IS THIS TITLE A PERIODICAL? (PRESS <Y> IF YES <ENTER>
                                                OTHERWISE) no
TYPE THE FIRST IMPORTANT WORD OF THE TITLE AND
                                        PRESS <ENTER>: "PETER"
TYPE THE SECOND IMPORTANT WORD OF THE TITLE
                                      AND <ENTER>: "PRINCIPLE"
(IF NONE, PRESS <ENTER>; IF UNKNOWN, PRESS <-> AND <ENTER>)
TITLE SEARCH:        PETER PRINCIPLE

tls/peteprinc

SEARCHING CIRCULATION RECORDS

FOUND 2 SIMILAR ITEMS

LOOKING FOR EXACT MATCH.  ONE MOMENT . . .
```

Figure 3. Sample Title Search (part 1)

A search for books and journals on a specific subject begins in FBR (see fig. 4). The patron starts by typing a term or terms and can then limit the search if necessary (e.g., TOPIC—T, etc.). The interface puts this request into the proper search algorithm and searches the authority file

```
01 PETER, LAURENCE JOHNSTON, 1919-THE PETER PRINCIPLE$NY 1970
02 PETER, LAURENCE JOHNSTON, 1919-THE PETER PRINCIPLE$NY 1969
THESE ITEMS MATCH YOUR REQUEST
TYPE A LINE NUMBER TO SEE CALL NUMBER OF THAT ITEM AND TO
     CHARGE, RENEW, ETC.; OR PRESS < ENTER > TO GO ON

   "2"
dsl/2
658P441P PETER, LAURENCE JOHNSTON,1919-THE PETER PRINCIPLE$NY
    922826    1969    2  ADDED:  780702
01    001   16-4W   STX    RNEWD  860212/860427    UC
02    002   16-4W   CRX
DO YOU NEED HELP WITH THE SYMBOLS. PRESS<Y>IF YES
                                          <ENTER>OTHERWISE
  "Y"
THE CALL NUMBER IS 658P441P.  THE LIBRARY HAS 2 HOLDINGS
LINE 01:  COPY 1 IS IN STACKS--CIRCULATION DESK/STACKS 2ND
        FLOOR LIBRRARY.
THE LOAN PERIOD IS 16 WEEKS FOR FACULTY -  4 WEEKS FOR OTHERS
BUT IT IS CHARGED OUT AND RENEWED. AND IT IS DUE APRIL 27
        1986
LINE 02:  COPY 2 IS IN COMMERCE -- 101 LIBRARY
THE LOAN PERIOD IS 16 WEEKS FOR FACULTY - 4 WEEKS FOR OTHERS
```

Figure 3. Sample Title Search (part 2)

(i.e., B ST for browse subject topical). The results in this search do not match what the person wants. The interface then will try to search the general authority file (i.e., not just for topics but also geographical, persons, etc.). Failing to find anything, the interface automatically does a

```
PRESS <C> TO CHARGE OUT,<R> TO RENEW,<S> TO SAVE,<ENTER> TO
      GO ON

WISH TO SEARCH OTHER LIBRARIES? (PRESS<Y>IF YES,<ENTER>
     OTHERWISE

    "Y"

TYPE AN INSTITUTION NAME, CITY NAME, LIBRARY CODE, OR <ENTER>
    FOR ALL

TRITON COLLEGE

tls/peteprinc/tc

DEPAUL UNIVERSITY

tls/peteprinc/dp
```

Figure 3. Sample Title Search (part 3)

keyword title search (F T for find title). We took this approach because of the problems inherent in subject searching.[5] The results of the search in figure 4 were two records and the patron asked to see record one. The searcher makes another attempt to find headings by pressing the "H" key and is given the relevant heading "Ballistic Missile Defenses." The interface would then go back into the authority file under a new subject heading "Ballistic Missile Defenses." This later approach finds twenty-five additional books about "star war defenses." The assumption being made here is that the first subject heading is the most important. This then leads the patron to additional sources. When the user needs to link to an LCS record for circulation information, the interface takes care of this too.

```
TO BEGIN, TYPE A TERM AS GENERAL AS POSSIBLE TO DESCRIBE THE
    SUBJECT:
(YOU'LL BE ASKED TO PROVIDE MORE SPECIFIC INFORMATION IN A
    MOMENT. )
      "STAR WARS DEFENSE"
TYPE A MORE SPECIFIC WORD OR PHRASE AND <ENTER>.
( PRESS <ENTER> IF YOU AREN'T SURE OF THE WORDING. )
PRESS <ENTER> FOR ALL OR PRESS THE CORRESPONDING KEY IF THE
     SUBJECT
IS ABOUT A TOPIC--<T>, PERSON--<P>, CORPORATE--<C>, OR
     GEOGRAPHIC AREA--<G>
SEARCHING THE FULL BIBLIOGRAPHIC RECORDS OF THE HOLDINGS
     ACQUIRED SINCE 1975
b st star wars defense
                                          AUTHORITY  DISPLAY
      1.    STAR WAR FILMS--JUVENILE LITERATURE
      2.    STARA PAZOVA, SERBIA
      3.    STARAIA RUSSIA (R.S.F.S.R)--MUSEUMS.
      4.    STARBORN MAGIC MUSHROOM
      5.    STARCH
      6.          --MARKETING.
      7.          --PERIODICALS
```

Figure 4a. Example of a Subject Search (part 1)

The interface is menu-driven with an interactive dialogue between the user and the personal computer. An analysis of research on user aspects of computer designs proved to us the following:

1. a menu dialogue should be employed when the command set is so large that users are not likely to commit all commands to memory;

```
      8.    STARCH IN MEDICINE
      9.    STARCH INDUSTRY
      10.         --EQUIPMENT AND SUPPLIES

THESE ARE THE CLOSEST SUBJECT HEADINGS. DO ONE OF THE FOLLOWING
TYPE A NUMBER AND <ENTER> TO SEE THE CORRESPONDING
    BIBLIOGRAPHIC RECORDS
PRESS <B> TO BROWSE--TO SEE MORE HEADINGS
PRESS <E> TO END THIS SEARCH
PRESS <I> FOR AN INTERPRETATION OF THE SYMBOLS TO THE LEFT OF
    THE HEADINGS
IF THESE HEADINGS ARE NOT SATISFACTORY, PRESS <ENTER> TO TRY
ANOTHER SEARCH
t s star wars defense
t s star wars defense#
TRYING TO FIND STAR WARS DEFENSE IN TITLES...
f t star war defense
                                        BIBLIOGRAPHIC DISPLAY
1. BOVA, BEN, 1932- ASSURED SURVIVAL PUTTING THE STAR WARS
   DEFENSE IN PERSPECTIVE / BEN BOVA. BOSTON : HOUGHTON
   MIFFLIN, 1984. VII 343 P. ; OCM10-780039
```

Figure 4b. Example of a Subject Search (part 2)

2. a menu dialogue should be considered for inexperienced users because little training is needed;
3. a menu dialogue should be used when at least some of the users may be unfamiliar with the system functions; and
4. that the wording and order of any menu should be consistent with the command language.[6]

```
2. SHERR, ALAN B. LEGAL ISSUES OF THE STAR WARS DEFENSE PROGRAM
   / BY ALAN B. SHERR :BOSTON: : LAWYERS ALLIANCE FOR NUCLEAR
   ARMS CONTROL, :1984?:  38 P. ; OCM11-418172
FOUND 2 RECORDS
THESE ARE SHORT RECORDS 1 - 2.  DO ONE OF THE FOLLOWING:
PRESS <C> FOR CIRCULATION INFORMATION.
TYPE A NUMBER AND <ENTER> TO SEE THE CORRESPONDING FULL RECORD
PRESS <ENTER> TO END RECORD DISPLAY
"1"
s 1
    BOVA, BEN, 1932
ASSURED SURVIVAL PUTTING THE STAR WARS DEFENSE IN PERSPECTIVE /
  BEN BOVA. BOSTON : HOUGHTON MIFFLIN, 1984
   VIII  343 P.  ; 22 CM
   BIBLIOGRAPHY : P. 342-343.  ISBN 0395364051
1. BALLISTIC MISSILE DEFENSES--UNITED STATES  2. ATOMIC WARFARE
3. SPACE WEAPONS  4. UNITED STATES--MILITARY POLICY  I. TITLE

PRESS <H> TO MAKE ANOTHER ATTEMPT TO FIND RELEVANT HEADINGS
    OR PRESS <ENTER> TO GO ON

   "H"
  A RELEVANT HEADING IS: BALLISTIC MISSILE DEFENSES
```

Figure 4c. Example of a Subject Search (part 3)

We met these criteria by having large numbers of different commands, users who were inexperienced, and two systems with completely different functions. A microcomputer-based menu interface solved our problem by eliminating the need for commands. Also the two systems become transparent to patrons. The difficult thought processes presented in figure 1 were no longer a problem.

The Benefits of Microcomputers

Using microcomputers has also allowed us to gain more than just a user friendly system. The benefits are applicable to any other system even if it was vendor developed.

More Efficient Use of a Mainframe or Minicomputer

There has been a reduction in our error rates in FBR. Errors averaged almost 28 percent on the nonpersonal computer or dumb terminals and fell to only 6 percent on the intelligent terminals (see fig. 5). This meant that on the dumb terminals, one in every four searches resulted in an error message. LCS, which is not as complicated as FBR, has also seen a corresponding drop in the number of bad searches. Two other studies have found error rates of 11 and 13 percent respectively.[7]

	PERSONAL COMPUTERS	OTHER TERMINALS
LCS	1%	11%
FBR	6%	28%

ERROR RATES FROM OTHER STUDIES:

BERKELEY	11 %
OHIO STATE	13 %

Figure 5. Average Error Rates for 1985

In addition, the load on the mainframe is balanced. Some people will be sending searches while others are still formulating their search strategy on the personal computers. This guarantees that hundreds of simultaneous commands do not reach the front-end processor at the same time. Every search on a computer, no matter if it results in a good response or an error message, takes up machine resources. With 35 million searches in LCS, an error rate of 11 percent meant that over 3.5 million searches wasted computer resources. This level of erroneous searches cannot be an efficient use of any machine. If the mainframe or minicomputer is not large enough to

handle the load, this error ratio can cause degradation of response time. Even with FBR and the introduction of more time-consuming keyword searches, we have not degraded response time.

Transparent Interface That Doesn't Require Learning System Commands

All searches, except subjects, go first to LCS because it contains records for everything cataloged at UIUC. Unsuccessful searches are then automatically routed to FBR. This routing takes place at the local level before the search goes to the mainframe. Commands are not input by the patron. Stopwords are not a problem. Explanations are given for all codes found in either LCS or FBR. Patrons are also led through a search of an authority file with cross and see references, then to the corresponding bibliographic record, and then to a separate database—LCS—which contains circulation information. The movement back and forth between FBR and LCS is invisible using the interface. The number of questions about how to use our system has dropped dramatically. Anyone using our library can search the online catalog for a known item or subject without needing help. Staff morale has improved tremendously.

Fast Interface and Short Interactions with Databases

Transmitting each line back and forth between a terminal and a distant mainframe can be slow. In addition to the communication distance, there is the possibility of slow response due to overloading the mainframe with additional searches. With a personal computer, nothing leaves the terminal until the search strategy is complete and correct. The initial communication is between the keyboard and the program in the personal computer and is therefore quite fast. Patrons know that the computer is working on their answer because the word "searching" blinks on the screen until a response appears.

Adaptable and Easily Changed Interface

It is advantageous to be able to improve the interface quickly as the system capabilities change. A local interface, using software that is purposely easy to update, helps accommodate system changes. It is also easy to test and fine tune a local interface. Our interface has gone through over thirty-five different versions in only three years. In addition, on a micro it is possible to have different types or levels of an interface on different terminals. There could be one version of the interface for undergraduates and visitors and another not as detailed for faculty offices.

The interface version available at UIUC allows the patron to charge out books. When a patron searches for a book, he is asked if he wants to charge out the book. The program asks for the patron's ID number and

then automatically charges the book out. An explanation is given on what happens next and whom to contact if there is a problem. Other LCS sites do not allow patron charging of local books and therefore have a different version of the interface.

William Potter analyzed the effect our personal computers have had on borrowing materials from other LCS schools. Before the personal computers, interlibrary borrowing using LCS was 2.8 percent of UIUC's total circulation on LCS. After the introduction of personal computers, this figure jumps to over 8 percent. The increase in absolute numbers was from 35,182 items borrowed in 1982 by UIUC from other LCS schools to 123,123 in 1985.[8] This represents a 350 percent increase. By the interface asking patrons if they want to borrow from another library, resource sharing increased significantly. Until the personal computers were introduced, patrons did not realize that they had access to over 15 million volumes around the state. This same concept could apply when the Statewide ILLINET Catalog becomes operational.

Another creative use of our interface occurs at a local public library. A version of the interface, available on a personal computer at the Urbana Free Library, automatically dials into our system. These public library patrons get to search our system to locate what they cannot find locally. Since our system searches by keyword and subjects, they also have more access points than the CLSI terminal located nearby. This same concept is applicable to people with home computers and modems.

Increased Computing Power and Decreased Costs per Megabyte

When we purchased our microcomputers in 1983, they cost us approximately $1700 each for 128K and no disk drives. Today, a personal computer with two disk drives and a ten-megabyte hard disk costs around $1600. Although this cost is somewhat higher than a dumb terminal, the benefits in computing power, speed, and potential to access other systems far outweigh this difference. The era of the twenty- or thirty-megabyte hard drives is rapidly giving way to drives with gigabyte storage. The microcomputer of today is equal in power to and lower in price than many minicomputers of a few years ago.

We are at present investigating the feasibility of putting the statewide ILLINET Online Catalog on compact disc-read-only memory (CD-ROM) using the LePac system developed by Brodart.[9] Using compact disc for ILLINET could extend access to this valuable resource to even the smallest libraries. Compact disc technology would not require telecommunications hookups or charges, and expanding the network would not create the need for additional mainframe computer facilities. With the era of "write often, read many times" CD-ROM around the corner, many online systems could fit into a micro having the capability of storing 4 million MARC records.

Hardwired Microcomputers Can Search Multiple Databases and Catalogs

All of the eighteen regional system libraries in Illinois have access to our online catalog. They use the online catalog for interlibrary loan and bibliographic verification. Most of them also have their own online catalogs or circulation systems. Having to remember commands for their own systems and then our difficult command structure caused many problems.

Through an Illinois State Library grant, Cheng set up microcomputers in three different system libraries. These personal computers search our online catalog using his interface. Then, by pressing a function key, they instantly switch to their Data Phase, CLSI, or DRA local circulation systems to search using the command language. Two communications cards and changes in the interface make this switching between systems located on two different types of computers possible. They use the keyword and subject searching capability of our system and then search for the books on their systems. This occurs using the same microcomputer. With additional programming even this process could be automatic and searches could be saved and executed from system to system.

Microcomputers as Information Gatekeepers

A microcomputer with an 100-megabyte hard disk or gigabyte CD-ROM drive can store and search local or vendor-supplied databases. It is possible to purchase portions of databases from BRS, mount them on a mainframe, and search using a microcomputer. This same microcomputer could store the results of that search. This result could then be run against an online catalog to see if the local library owns the journals or reports.

We recently purchased InfoTrac for our Undergraduate Library. InfoTrac searches for magazine articles using an optical disc and a personal computer. At present, students must leave the InfoTrac terminal and proceed to a different terminal to search the online catalog. It would be far more beneficial if this same microcomputer could switch and search our online catalog. A patron would instantly know if we had the journal and its call number. We have already tied two different online systems together in the system libraries. This same microtechnology could also do this with InfoTrac and an online catalog. Having to search systems using different terminals would become obsolete.

An attempt at an end user searching system connected to the online catalog is being developed by our engineering librarian, Bill Mischo. Figure 6 is a prototype screen for a microcomputer-based system for librarians to automatically dial up and log on many systems.[10] Bill is adapting this prototype to allow students to automatically dial up some databases on BRS. After searching BRS, the results are run against our online catalog to determine if we own the items. All this will take place using an IBM-AT

personal computer. This one terminal will be an information gatekeeper and will allow access to books and to various periodical indexes.

DATABASE VENDORS OR NETWORKS:
0. LCS/FBR
1. BRS—TELENET
2. BRS—TYMNET
3. DIALOG—TELENET
4. DIALOG—TYMNET
5. OCLC—TELENET
6. OCLC—TYMNET
7. RLIN—TYMNET
8. SDC—TELENET
9. SDC—TYMNET
10. RESUME SEARCHING—ALREADY ONLINE
11. PRINT PREVIOUSLY DOWNLOADED DATA
12. SIMULATION OF ONLINE SEARCH
13. LOGON BY SEARCHER
14. LCS VIA SWITCH
15. REFERENCE INFORMATION
16. KNOWLEDGE INDEX—TELENET
17. KNOWLEDGE INDEX—TYMNET

CHOOSE ONE OF THE NUMBERS

Figure 6. Illinois Search Aid for Expediting Online Database Searching

Although I painted a rosy picture of microcomputers and how they help make our system user friendly, there is one problem for dial-access patrons. Unless the dial-up user has an IBM personal computer, he or she will have to use commands to search our system. Since we support nine dial-up ports and two ports connected to a coaxial cable on campus, this could be a problem. However, the trade-off for having a user friendly system in the library *v.* the old system made the microcomputer our answer.

Conclusion

I began this discussion with a quote by McLuhan who said "If it works it's obsolete." That might be true of some technology but not completely true when discussing microcomputers. Any given machine, like the eight-bit machine, might become obsolete. However, this indicates that care be

taken in choosing a machine that is state of the art. Another important consideration is that the microcomputer is expandable to take advantage of any future technological changes. A recent advertisement for the Compaq portable sums up the revolution taking place in microcomputers. It said: "Introducing the new Compaq Portable II—30% smaller, 17% lighter, and 400% faster!"[11]

Finagle's statement "The information you need is not available" is also rapidly becoming obsolete. It is possible that the information is available in one of over 3010 publicly available databases or within one of the 1.7 billion online records.[12] The problem that remains is how to make the public aware of this fact and how to allow them easy access.

Our experience with microcomputers has led me to the realization that they are the tool to unlock these bulging information storehouses. Just as our interface made resource sharing easy and increased interlibrary borrowing, so too could microcomputers act as information gatekeepers.

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